

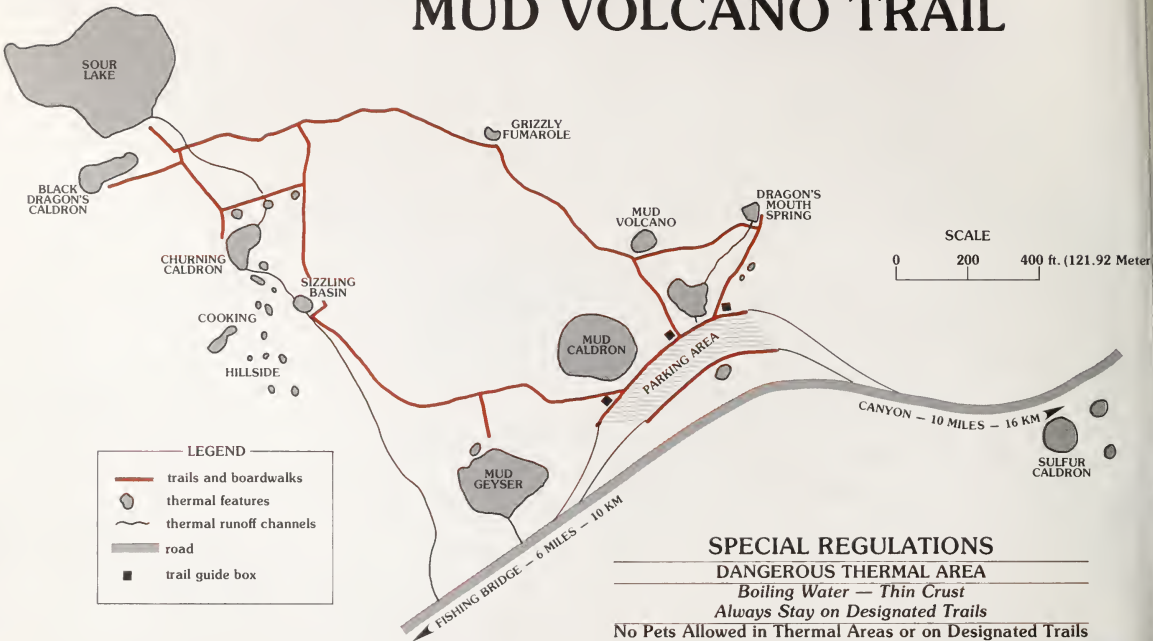
MUD VOLCANO TRAIL



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YELLOWSTONE NATIONAL PARK

MUD VOLCANO TRAIL



Turbulent pools of hot muddy water; hillsides strewn with trees cooked by steam; strange odors; and a bleak, barren landscape —

This is the exciting Mud Volcano area; a unique place in Yellowstone National Park. You can explore the Mud Volcano area with the aid of this booklet by following the wooden boardwalk. Start at the Mud Caldron as the first stop in your $\frac{2}{3}$ mile (1 kilometer) loop trip.

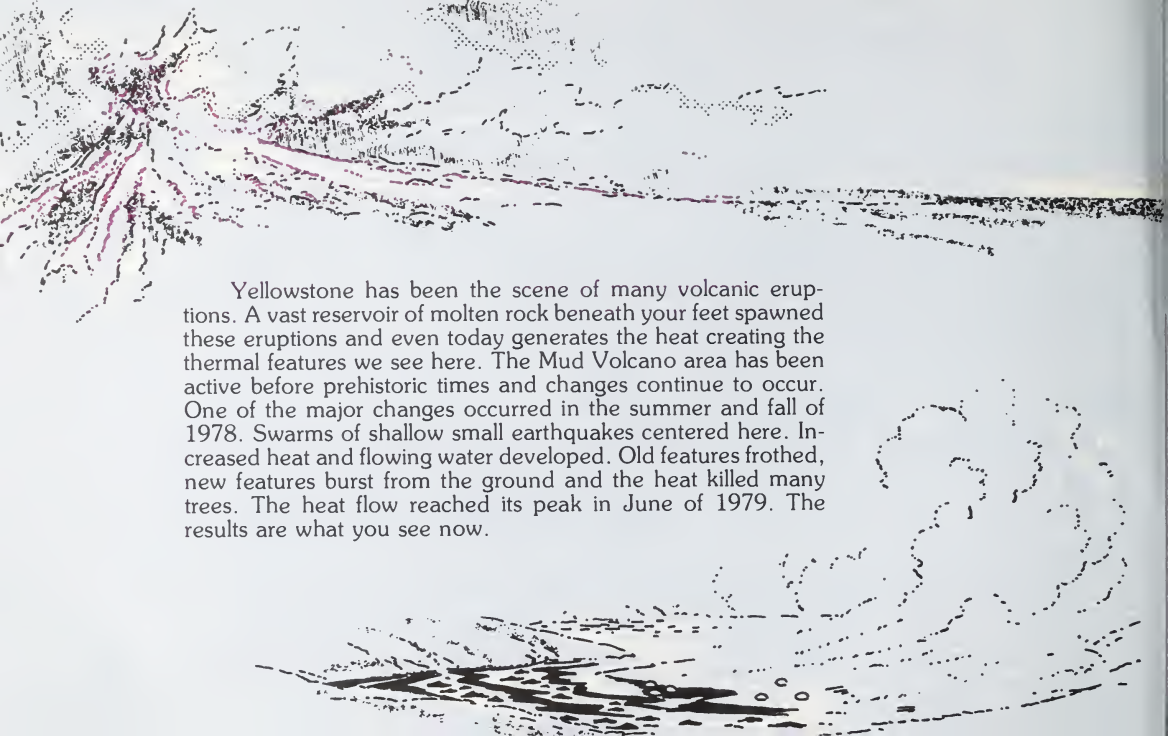
DANGEROUS THERMAL AREA

Boiling Water — Thin Crust

FOR YOUR SAFETY REMEMBER —

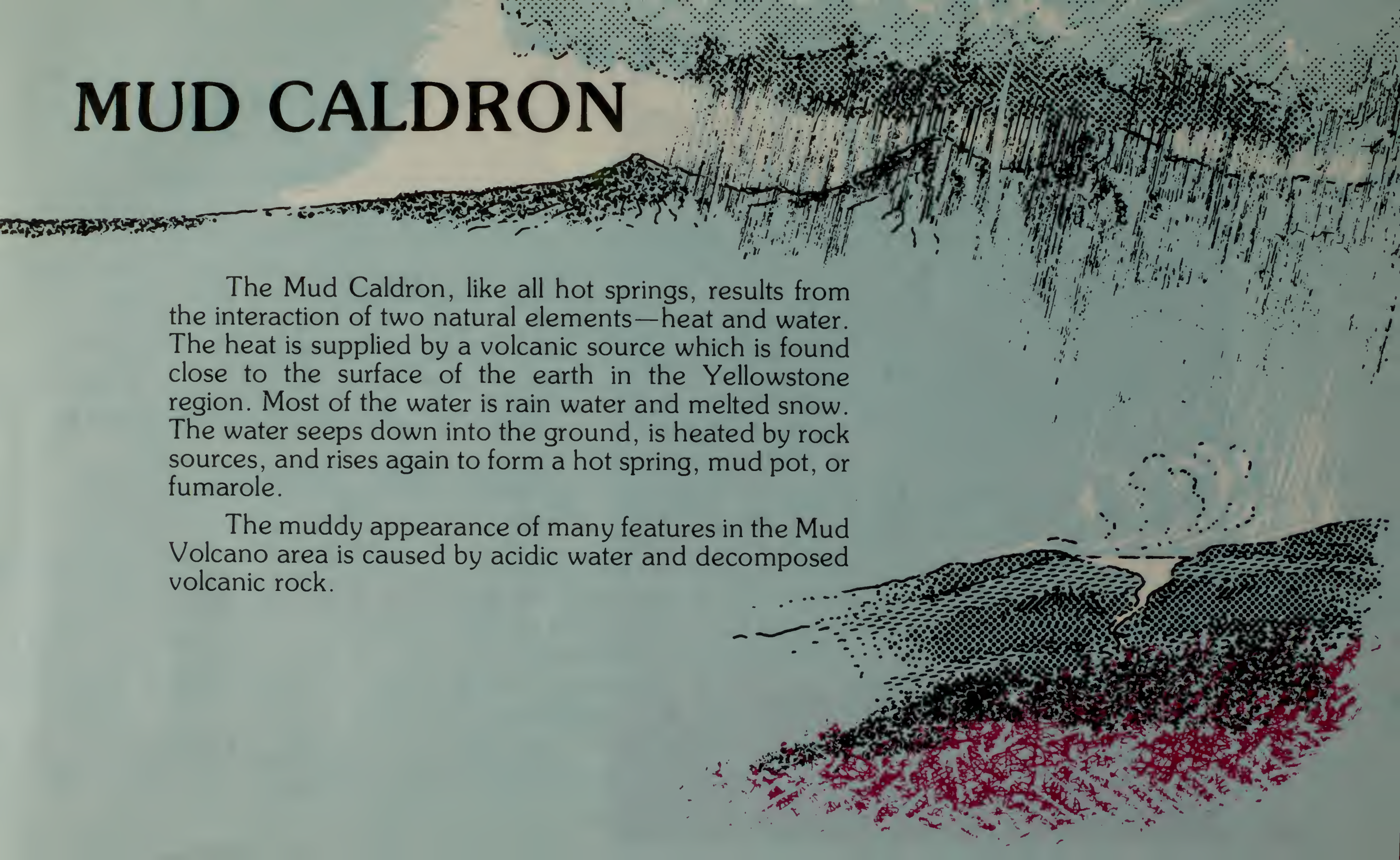
It is unlawful to:

- Travel off designated trails
- Take pets in thermal areas
- Throw objects into thermal features



Yellowstone has been the scene of many volcanic eruptions. A vast reservoir of molten rock beneath your feet spawned these eruptions and even today generates the heat creating the thermal features we see here. The Mud Volcano area has been active before prehistoric times and changes continue to occur. One of the major changes occurred in the summer and fall of 1978. Swarms of shallow small earthquakes centered here. Increased heat and flowing water developed. Old features frothed, new features burst from the ground and the heat killed many trees. The heat flow reached its peak in June of 1979. The results are what you see now.

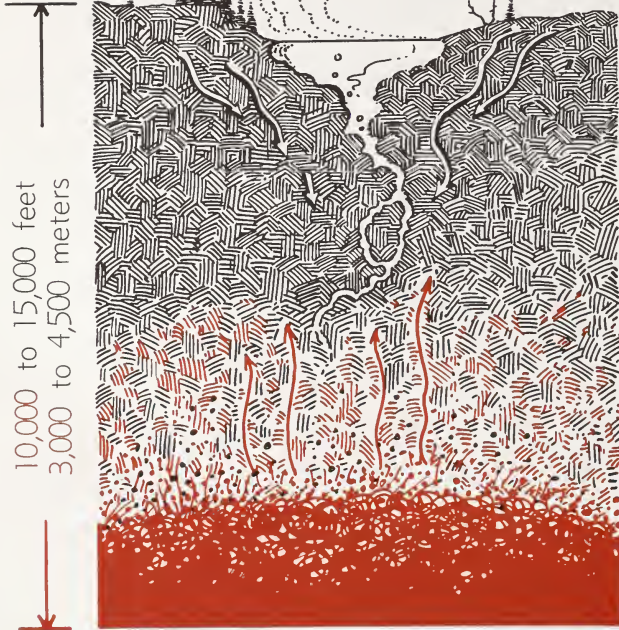
MUD CALDRON



The Mud Caldron, like all hot springs, results from the interaction of two natural elements—heat and water. The heat is supplied by a volcanic source which is found close to the surface of the earth in the Yellowstone region. Most of the water is rain water and melted snow. The water seeps down into the ground, is heated by rock sources, and rises again to form a hot spring, mud pot, or fumarole.

The muddy appearance of many features in the Mud Volcano area is caused by acidic water and decomposed volcanic rock.

HOT SPRING



Surface water seeps
into ground

Water absorbs heat from
rock and gases

Hot rock and gases

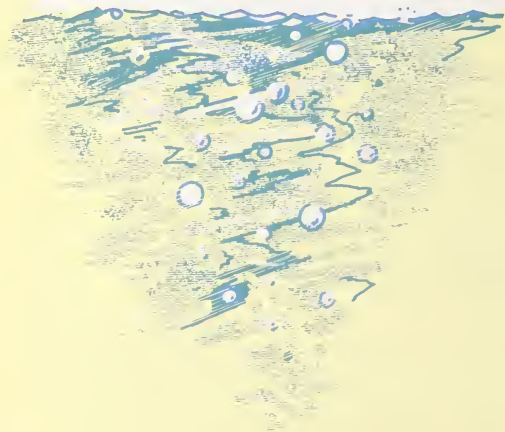
Volcanic source- Molten rock

MUD GEYSER

When it was first seen by the U.S. Geological Survey Party in 1871, Mud Geyser erupted to a height of 40 ft. (12 meters). Since that time, neither Mud Geyser nor any other feature of the Mud Volcano has been known to erupt. True geyser eruptions are caused by water flashing into steam near the surface which forces water up into the air from a pool or vent. The “boiling” appearance of many hot springs at Mud Volcano is caused by gases that form deep in the earth, rise to the surface and are released through these pools.

“COOKING HILLSIDE”

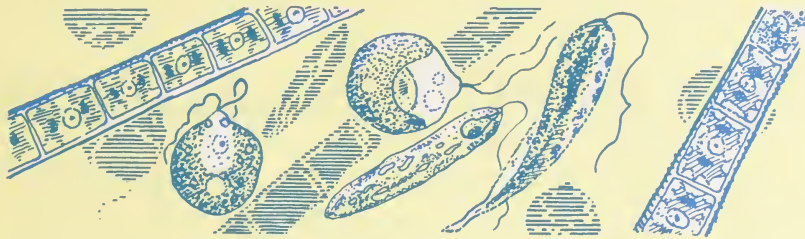
Before the winter of 1978-79 the hillside ahead of you was covered with green grass and trees. It was completely changed by new thermal activity stimulated by the swarms of shallow local earthquakes. Cooking Hillside does not have a large source of water, yet the barren steaming ground clearly shows the great amount of heat reaching the surface. Temperatures close to 200°F (93°C) have been detected on the barren ground. “Cooking Hillside” is evidence of the exciting changes taking place before our very eyes!



SIZZLING BASIN

For many years, this spring was wide and shallow, with a gravelly, sandy bottom through which gas bubbles would burst, reminding us of the way hot oil sizzles in a frying pan. With the recent changes, the pool is hotter, deeper, and discharges more gas.

You have probably noticed the odor of “rotten eggs”. This is the smell of hydrogen sulphide, one of the gases which rises from these hot springs. Other gases include water vapor and carbon dioxide. Water vapor is the most abundant of these gases, and condenses to steam as it cools. The foam and bubbles floating on the surface are due to the presence and action of carbon dioxide.

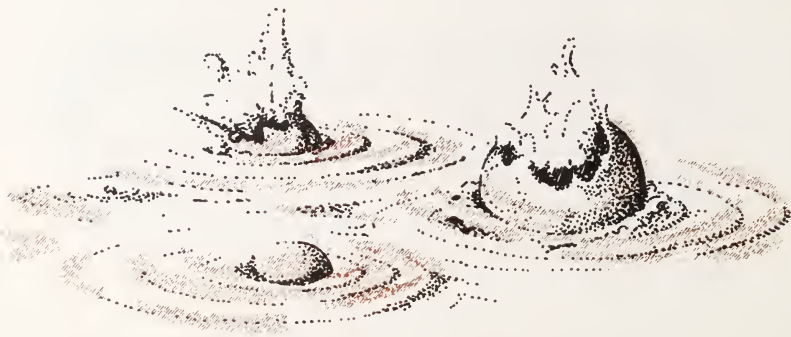


CHURNING CALDRON

Here at Churning Caldron you can see the action of gases again. Until the increase of activity in 1978, this water teemed with microscopic one-celled algae which occasionally formed heavy green mats covering much of the water surface. After staying around 100°F (38°C) for many years, the pool heated up to 145°F (63°C). Then the water became too hot and too agitated for the algae to survive.

BLACK DRAGON'S CALDRON

The cracks and fissures through which the volcanic gases rise and the surface waters descend are constantly changing. This spectacular explosive spring did not exist prior to 1948. In the spring of that year the Black Dragon's Caldron burst into existence. It has since slowly shifted some 200 feet (60 meters) from the point at which it first formed. The spring which feeds nearby Sour Lake was much more active before Black Dragon's Caldron formed than it is now. We can speculate



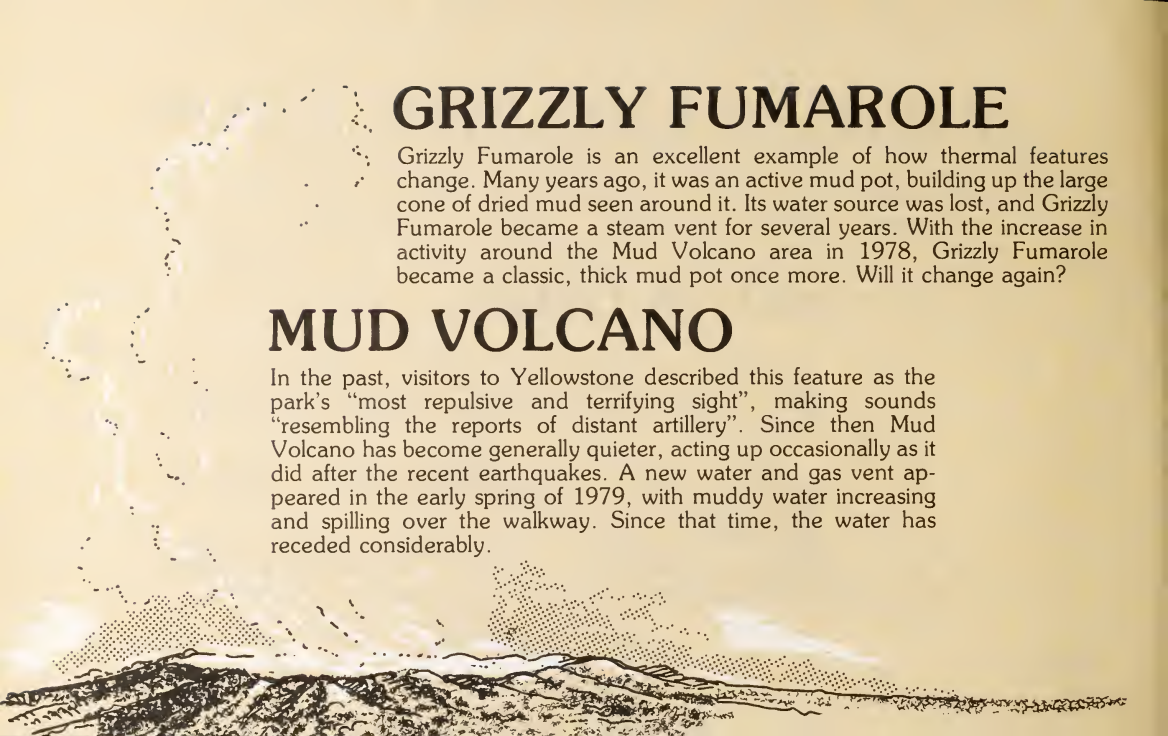
that underground changes diverted heat energy from Sour Lake to form this seething mass of black mud. The black color of this caldron is due to the presence of iron compounds.

SOUR LAKE

Sour Lake is so named for its acid water that gives it a sour taste. Hydrogen sulphide rising from the volcanic depths reacts with oxygen in the descending ground water to form mild sulphuric acid.

The dead trees within the lake show us that it is now more extensive than it once was. Notice the dark acid burns on the remaining stumps.

The fallen trees near the walk were killed by an overflow in earlier years. Sour Lake and Black Dragon's Caldron demonstrate the highly unstable nature of the Park's hot spring features.



GRIZZLY FUMAROLE

Grizzly Fumarole is an excellent example of how thermal features change. Many years ago, it was an active mud pot, building up the large cone of dried mud seen around it. Its water source was lost, and Grizzly Fumarole became a steam vent for several years. With the increase in activity around the Mud Volcano area in 1978, Grizzly Fumarole became a classic, thick mud pot once more. Will it change again?

MUD VOLCANO

In the past, visitors to Yellowstone described this feature as the park's "most repulsive and terrifying sight", making sounds "resembling the reports of distant artillery". Since then Mud Volcano has become generally quieter, acting up occasionally as it did after the recent earthquakes. A new water and gas vent appeared in the early spring of 1979, with muddy water increasing and spilling over the walkway. Since that time, the water has receded considerably.

The rhythmic belching of steam and the flashing tongue of water as it strikes out from the cavernous opening have given this spring its name—the Dragon's Mouth. The surging action gives the impression of a great discharge of water, but a glance at the run off channel shows that this is not so. Here, too, the water is used over and over.

DRAGON'S MOUTH

This pool is violent. Its hot waters 180°F (82°C), its seething, rumblings from its inner caverns—all bespeak of power and energy.

The Dragon's Mouth—as are all of Yellowstone's hundreds of hot springs and geysers—is powered by a source of volcanic heat buried beneath your feet. This volcanic heat source supported great volcanic outbursts in the past. Does the Dragon's Mouth represent the dying state of this period of violence? Or are the great earth forces simply resting? Only time will tell.



SULFUR CALDRON

Have you stopped across the road to see Sulphur Caldron? As the most acid spring found in Yellowstone, Sulfur Caldron has about the same sourness as battery acid or stomach fluids.

Also, notice the color of Sulfur Caldron. Various minerals cause differences in the colors of the pools. The striking yellow color of Sulfur Caldron is due to its high sulfur content.

A bacterium causes the turbidity of Sulfur Caldron; so the cloudiness is not caused by mud or suspended soil particles. Compare the color of Sulfur Caldron with the mud pots just to the north along the road. Those hot springs are black and muddy, indicating that the sulfur is in a different form (iron sulfide) and the underground water sources are not connected preventing a mixing of the springs.

WATER — HEAT — AND WINTER SURVIVAL

Water in this thermal area has been subjected to hard treatment underground. It surfaces with a load of heat, gases, dissolved minerals and sediment.

In a sense, it is naturally polluted. But nature has a way of purifying this water. In a short distance, much of the gas and heat dissipates. Chemicals change to more stable compounds, are redeposited or greatly diluted, and sediments drop out. Such purification systems have been working since the earth began.

Animals utilize these special places of heat, water, and food. Thermal basins such as the Mud Volcano Area serve as winter homes where bison, elk, and birds survive. The warm ground serves to keep them warm, melt the snow and expose food in the form of vegetation. The combination creates sheltered spots during Yellowstone's harsh winters. We often forget about this when we walk around the Mud Volcano Area on a warm sunny day.

Thus nature provides a respite for its creatures when it would appear that the stress of winter survival is intolerable.

To learn more about the geothermal features of Yellowstone stop at the nearest visitor center. Trained ranger naturalists are on duty to answer your questions.

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